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09/197,499 11/23/98 SHIMAZU

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EXAMINER

NGUYEN, N

ART UNIT

PAPER NUMBER

1754

DATE MAILED:

03/27/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/197,499

Applicant(s)

SHIMAZU et al

Examiner

N. M. NGUYEN

Group Art Unit

1754

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE three (3) MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

- ☒ Responsive to communication(s) filed on Feb 13, 2001
- ☐ This action is FINAL.
- ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- ☒ Claim(s) 1, 5-6, 8, 11-20 is/are pending in the application.
- Of the above claim(s) 11-17 is/are withdrawn from consideration.
- ☐ Claim(s) _____ is/are allowed.
- ☒ Claim(s) 1, 5-6, 8, 18-20 is/are rejected.
- ☐ Claim(s) _____ is/are objected to.
- ☐ Claim(s) _____ are subject to restriction or election requirement.

Application Papers

- ☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.
- ☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.
- ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- ☐ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

- ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
 - ☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been received.
 - ☐ received in Application No. (Series Code/Serial Number) _____.
 - ☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

Attachment(s)

- ☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____
- ☐ Notice of Reference(s) Cited, PTO-892
- ☐ Notice of Draftsperson's Patent Drawing Review, PTO-948
- ☐ Interview Summary, PTO-413
- ☐ Notice of Informal Patent Application, PTO-152
- ☐ Other _____

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DETAILED ACTION

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 13, 2001 has been entered.

Claim 20 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicants are requested to point support in the instant specification, by page and line numbers, for "a powder Raney catalyst" which can be used for a fixed bed as required in the instant claim 20. It should be noted that the lump Raney catalyst for a fixed bed is used for a hydrogenation process, and after such used, the lump Raney catalyst can be reactivated by crushing into powder (note page 6, second full paragraph). However, it appears that the instant specification does not disclose that such powder Raney catalyst can be used for fixed bed.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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Claims 1, 5-6, 8, 18-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1 "power type" is indefinite because it is unclear if the catalyst is a powder or it would include some other forms. Also, in claim 1, in step (iv), it is unclear which portion of the alloy after the classifying step is activated? If all portions are separately activated then which portion would be used in step (v)?

Claim 5, it is required that the quenched lump alloy particles are classified by grain diameter, however, it is unclear which particles would be activated in the subsequent step to form the Raney catalyst?

In claim 20, it is unclear if the powder Raney catalyst of claim 20 still can be a fixed bed catalyst. It is suggested that claim 20 be converted into an independent claim.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 5 is rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Schuetz et al (5,536,694).

Schuetz '694 discloses a fixed-bed catalyst consists of powder particles of the catalyst alloy which are bonded by sintering with a powder (i.e. the binder) of the Raney process metal itself. It contains no catalytically inactive binder at all (note column 5, lines 21-25). Ni and Al were used (note Table 2, Example 1). The limitation of "with molybdenum and/or tin up to 15%" includes the value of zero.

Alternatively, Schuetz '694 discloses that various processes are known for preparing molded items, for example, coarse particulate, i.e. only coarsely milled Raney alloys are available which can be activated by treatment with caustic soda solution (note column 1, lines 55-60).

Either product as disclosed in Schuetz '694 anticipates the claimed product.

Alternatively, any difference imparted by the product by process limitations would have been obvious to one having ordinary skill in the art at the time the invention was made because where the examiner has found a substantially similar product as in the applied prior art the burden of proof is shifted to the applicant to establish that their product is patentably distinct not the

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examiner to show that the same process of making, see *In re Brown*, 173 U.S.P.Q. 685, and *In re Fessmann*, 180 U.S.P.Q. 324.

Claims 1, 18, 20 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Schuetz '694.

Schuetz '694 discloses that activated metal catalysts are known as Raney catalysts in the chemical engineering field. They are used mainly in the powdered form in a large number of reactions for hydrogenating organic compounds. These powdered catalysts are prepared from an alloy of a catalytically active metal and another alloying component which is leachable in alkalis. The Raney process metals used are mainly Ni, Co, Cu or Fe. The alloying component which is mainly used is Al (note column 1, lines 30-41). This so called Raney alloy is first finely milled according to Raney's method. Then the aluminum is completely or partially removed by leaching with alkalis such as, for example, caustic soda solution (note column 1, lines 42-50).

The powder Raney catalyst as disclosed in Schuetz '694 anticipates the claimed product.

Alternatively, any difference imparted by the product by process limitations would have been obvious to one having ordinary skill in the art at the time the invention was made because where the examiner has found a substantially similar product as in the applied prior art the burden of proof is shifted to the applicant to establish that their product is patentably distinct not the examiner to show that the same process of making, see *In re Brown*, 173 U.S.P.Q. 685, and *In re Fessmann*, 180 U.S.P.Q. 324.

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Claims 5, 8, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schuetz '694.

Schuetz '694 discloses a fixed bed catalyst as stated above. The ratio by weight of Raney process metal to leachable alloying component in the catalyst alloy is in the range from 30:70 to 70:30 as is usual with Raney alloys (note column 3, lines 59-63). This range overlaps the claimed range. The ratios by weight of catalyst alloy powder to binder in the range 100:20 to 100:0.5 have proven to be useful (note column 5, lines 51-52). The catalytically active metal is selected from the group consisting of nickel, cobalt, copper, iron and mixture thereof (note claim 3), the leachable alloy component is selected from the group consisting of aluminum, zinc, silicon and mixture thereof (note claim 4). Specifically, Ni and Al is used in Example 1 (note Table 2)

The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a prima facie case of obviousness, see *In re Malagari*, 182 U.S.P.Q. 549.

Schuetz '694 further disclose discloses that the catalysts may be doped with other metals in order to influence their catalytic properties. Doping and promoting Raney catalysts are known in the art and suitable promoters are chromium, iron, cobalt, molybdenum, etc. They are expediently added as alloy components in the catalyst alloy. Their proportion in the catalyst alloy is typically up to 15 wt% (note paragraph bridging cols 5-6). It would have been obvious to the skilled artisan to determine the type, the amount of the metal dopant by routine experimentation.

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It would have been obvious to one of ordinary skill in the art at the time of the invention was made to add Mo and/or Sn to the catalyst of Schuetz '694 because it is known in the art that doping metals can influence their catalytic properties.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schuetz '694 in as applied to claims 5, 8, 19 above, and further in view of Lepper et al (4,520,211).

Schuetz '694 discloses a fixed bed catalyst with the size of 5.2 x 3 mm (note last two lines of column 7). The disclosure of Schuetz '694, however, should not be limited to just the exemplified size. It would have been obvious to one of ordinary skill in the art to optimize the size of the shaped, activated catalyst of Schuetz '694 in order to obtain the best results.

Lepper '211 teaches that in a process of making polyhydric alcohols (i.e. sugar alcohols) by the hydrogenation of carbohydrates, a "catalyst solid bed" is preferred. The catalyst solid bed is defined as stationary arrangement of the catalyst in the reactor in the manner of a packed bed (note column 2, lines 47-52), thus the catalyst solid bed in Lepper is considered the same as a fixed bed catalyst. Lepper further discloses that the particle size of the catalyst employed in lumpy form may vary widely. On the one hand, the catalyst particles should not be so small that the flow resistance of the catalyst solid bed greatly hinders the through flow of the mixture of hydrogen and aqueous carbohydrate solution and necessitates too high a pressure. On the other hand, the maximum dimensions of the lumpy catalyst are given by the reactor geometry. As a rule, the particle size of the catalyst lumps, i.e. the diameter and/or length of the catalyst particles,

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will be selected so that it is in the range of from about 2 to 10 mm (note column 3, lines 16-32). This range overlaps the claimed range. The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a prima facie case of obviousness, see *In re Malagari*, 182 U.S.P.Q. 549. It is noted that the in Lepper '211, the catalyst is a ruthenium-containing catalyst, not a Raney catalyst, however, only the physical size of the catalyst (not the composition of the catalyst) has direct impact on the flow resistance, etc., as discussed above, for the hydrogenation process.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to optimize the particle size of the shaped, activated catalyst of Schuetz '694 within the range suggested by Lepper '211 because such range is desired for a fixed bed catalyst in the hydrogenation process.

Claims 1, 5, 8-10, 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schuetz et al (5,536,694) in view of Raney (1,628,190) and optionally further in view of Richter (3,673,116).

Schuetz '694 discloses that activated metal catalysts are known as Raney catalysts in the chemical engineering field, they are used mainly in the powdered form in a large number of reactions for hydrogenating organic compounds. These powdered catalysts are prepared from an alloy of a catalytically active metal and another alloying component which is leachable in alkali.

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The catalytically active metals used are mainly Ni, Co, Cu or Fe. The alloying component which is mainly used is aluminum (note column 1, lines 30-41). Schuetz '694 further teaches that powder catalysts have the disadvantages that they can only be used in batch processes and have to be isolated after the catalytic reaction by time-consuming filtration of the reaction media. Various processes for preparing molded items have therefore been disclosed which lead to activated metal fixed bed catalysts after extraction of the aluminum. Thus, for example, coarse particulate, i.e. only coarsely milled, Raney alloys are available which can be activated by treatment with caustic soda solution (note column 1, lines 51-60). When coarse particulate is desired to be used in fixed bed catalyst, it would have been obvious to one of ordinary skill to remove any particles with undesirable size before activating the Raney alloy.

The difference is Schuetz '694 does not specifically disclose the process of making the Raney alloys even though Schuetz '694 does disclose that such alloys are known in the art.

Raney '190 discloses a method of producing metallic nickel in a catalytic state such as may be used in the hydrogenation of oils, fats, waxes and the like (note page 1, lines 5-7). The process comprises the steps of alloying metallic nickel with metals such as silicon and aluminum in various proportions, and then dissolving the aluminum and silicon from the alloy by means of a solvent which will not attack the nickel, whereupon the nickel remains in a finely divided state (note page 1, lines 8-13). The alloying is carried out by melting the nickel, aluminum and silicon either separately, or together, cooling the melt and pulverizing the solidified alloy. Raney '190 further discloses that the nickel aluminum alloy may be either very finely pulverized or it may be broken

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in pieces the size of peas or smaller. In either condition, the alloy may be treated with caustic soda or the aluminum removed with the use of some other solvent. In case the larger pieces are used, the nickel is left in a more or less spongy and porous state, somewhat similar to a cinder, and for certain classes of work is necessary and desirable to have the catalyzer in this condition (note page 1, lines 81-92).

Optionally, Richter '116 can be applied to teach in the well known process of making Raney catalyst, "cooling" is quenching, or at least cooling is preferred to be quenching, note in Example 1, "cooled" is used and in Example 2, "quenching" is used. Also, Richter discloses that it was found beneficial to cool rapidly the Raney alloy produced by melting by excluding air, since the fine crystalline texture of the Raney alloy which occurs during the quenching of the melt, is easy to homogenize (note column 2, lines 39-43).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to use the known Raney process such as the process disclosed in Raney '190 which comprises the steps of melting , cooling or quenching, pulverizing, to produce the Raney alloy in the process of Schuetz '694 and to only coarsely pulverize the alloy in order to use coarse particles in a fixed bed as disclosed in Schuetz '694.

It also would have been obvious to one of ordinary skill in the art at the time of the invention was made to further pulverize the coarse particles to obtain finer particles when powder catalyst is desired. It should be noted that in Schuetz '694, both powder catalyst or coarse catalyst can be used.

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Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schuetz '694 in view of Raney '190, optionally in view of Richter '116 as applied to claims 1, 5, 8-10, 18-20 above, and further in view of Lepper et al (4,520,211).

The difference is Schuetz does not disclose the size of the coarse catalyst used for the fixed bed.

Lepper '211 is applied as stated in the above rejection to teach the desired particle size for a fixed bed catalyst used in a hydrogenation process.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to coarsely milled the Raney alloy as disclosed in Schuetz '694 within the range suggested by Lepper '211 because such range is desired for a fixed bed catalyst in the hydrogenation process.

Claims 5-6, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Diffenbach et al (3,719,732) in view of Lepper '211.

Diffenbach '732 discloses a process for producing active catalyst particles comprising:
providing a melt consisting essentially of an alloy selected from the group consisting of Al-Ni, Al-Co, Al-Fe and Al-Cu;
forming said melt into discrete droplets;
simultaneously shaping and cooling said droplets by dropping said droplets into a vaporizable liquid (i.e. quenching);

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leaching at least a part of said aluminum content from said shaped particles so that the shaped active catalyst contains at least 10% of the non-aluminum component (note claim 1).

The Ni-Al composition varies from 40-60 Ni-Al to 10-90 Ni-Al (note Table in column 6). This range overlaps the claimed range, see In re Malagari as stated above. The particles having a diameter of from about 1/4 to 1/2 inch (= 6.35-12.7 mm) (note column 5, lines 69-70). The range of "up to 15%" for the Mo and/or Sn would include zero.

The difference is Diffenbach '732 does not disclose the step of pulverizing the shaped particles before the leaching step.

Lepper '211 is applied as stated above to teach that the desired particle size for a fixed bed catalyst is between 2-10 mm.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to grind the particles produced in the process of Diffenbach '732 to obtain a slightly smaller (i.e. coarsely grind) particle size as suggested by Lepper '211 because the smaller size is more desired for the fixed bed catalyst.

Claims 1, 5-6, 8, 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over . over Diffenbach '732 in view of Lepper '211 and further in view of Schuetz '694.

Diffenbach '732 and Lepper '211 are applied as stated above.

The difference not yet discussed is Diffenbach '732 does not disclose the second pulverizing step and the presence of Mo and/or Sn.

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Schuetz '694 is applied as stated above to teach that both fixed bed catalyst, i.e. coarse catalyst and powder catalyst, i.e. finer catalyst are desired in the art and the addition of doping metals to the catalyst is desired in the art.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to further pulverizing the Raney catalyst of Diffenbach '732 when the powder catalyst is desired as suggested by Schuetz '694.

Applicant's arguments filed April 7, 2000 have been fully considered but they are not persuasive.

Applicants argue that on pages 6-7 of the instant specification, it is disclosed that on pages 6-7 that the lump form Raney catalyst may be collected, crushed into powder and then reactivated to be reused and the preceding paragraphs characterize the "use" of the catalyst in the fixed bed form.

The argument is not persuasive because even though the powder can be reused as disclosed in Applicants' specification, however, there is no indication that the powder form can be in a fixed bed. It should be noted that in Example 1, under "Catalyst reuse", the powder form catalyst is used in a "stirring type autoclave" not in a fixed bed. Furthermore, Applicants' specification discloses that "if the grain diameter is too small, it is difficult to compose a fixed catalyst layer and even when it is composed, reaction mixture flows more slowly and it is no more possible to produce sugar-alcohol with a high productivity" (note sentence bridging pages 3-4).

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Thus, it appears that after the crushing step, the particle size of the catalyst would be too small to form a fixed bed layer.

Applicants argue that in the claimed invention, the lump form Raney catalyst which has an evenly thick active surface layer of the catalytic alloy will lose its activity upon repeated use as a hydrogenation catalyst, and the catalytic alloy existing inside of the used lump alloy form Raney catalyst can be activated by crushing the lump catalyst, thereby exposing the inactive inner layer followed by activation treatment with an alkali solution.

Granted that the process of Applicants' claimed invention involves the step of crushing used lump form Raney catalyst and activating the crushed catalyst to form powder catalyst, however, there is no structure difference between the claimed powder catalyst and the finely milled Raney catalyst as disclosed in Schuetz '694.

Applicants argue that in Schuetz, the binder used in production of catalyst disclosed is for the purpose of making a molded catalyst keeping the bond of powder type catalytic alloy and does not contain the metallic ingredients dissolved out by alkali treatment such as aluminum, silicon.

Granted that Schuetz used Raney metal as the binder, however, the catalyst still contains metallic ingredients which can be dissolved out by alkali treatment (note Table 1, aluminum weight percent).

Applicants argue that Schuetz only disclose the conventional powder type catalyst and fail to teach or suggest either powder type Raney catalyst obtained by crushing a molded catalyst or

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reusing the molded catalyst once rendered inactive upon continued used as a hydrogenation catalyst.

Schuetz fairly discloses both the powder type (note column 1, lines 30-50) and the lump form (note column 1, lines 55-60 and claim 1).

Applicants argue that the catalyst of Schuetz has a porous structure all over the catalyst.

In the paragraph Applicants referred to, organic additives burn off and leave behind a corresponding pore system". However, the organic additives are only optional in Schuetz (note "optionally" language in claim 1). When they are not used, the product of Schuetz would not have the "pore system".

Applicants argue that Schuetz discloses the presence of inner catalytic layers susceptible to activation after the coarsely milled Raney alloy has been rendered inactive while in the claimed invention, the used lump form catalyst is crushed into powder and is wholly reused.

The process of reusing the used lump form in the claimed invention may be different than that of Schuetz, however, Applicants have not pointed out any difference between the coarsely milled Raney catalyst as disclosed in Schuetz and the claimed fixed bed catalyst (or lump form catalyst).

Applicants argue that in Diffenbach, the catalyst has high aluminum content.

At least for the independent claim 5, no amount of aluminum is required. In any event, the amount of aluminum in the alloy of Diffenbach overlaps the claimed range. See In re Malagari as stated above.

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The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication should be directed to Ngoc-Yen Nguyen at telephone number (703) 308-2536.

The fax phone number for this Group is (703) 305-3599 (for OFFICIAL faxes).
UNOFFICIAL fax can be sent to (703) 305-6078.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0661.

N. M. Nguyen
March 26, 2001



N. M. Nguyen
Primary Examiner
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